

## 阅读申明

- 1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
- 2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
- 3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描述上的差异，建议读者做出适当判断。
- 4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有“数据手册”字样。

## Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.
2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.
3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.
4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets" .

# KA3303/KA3403

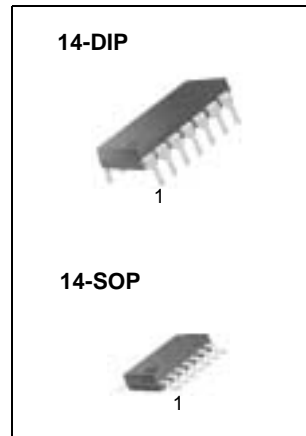
## Quad Operational Amplifier

### Features

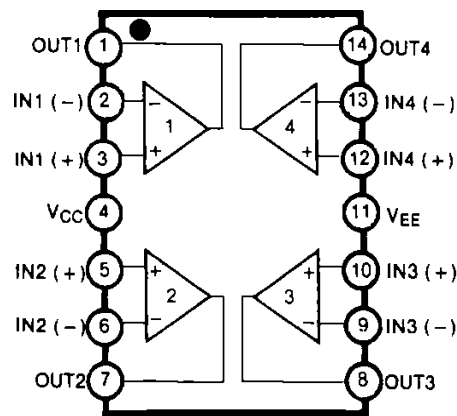
- Output voltage can swing to GND or negative supply
- Wide power supply range;
- Single supply of 3.0V to 36V
- Dual supply of  $\pm 1.5V$  to  $\pm 18V$
- Electrical characteristics similar to the KA741
- Class AB output stage for minimal crossover distortion
- Short circuit protected output.

### Description

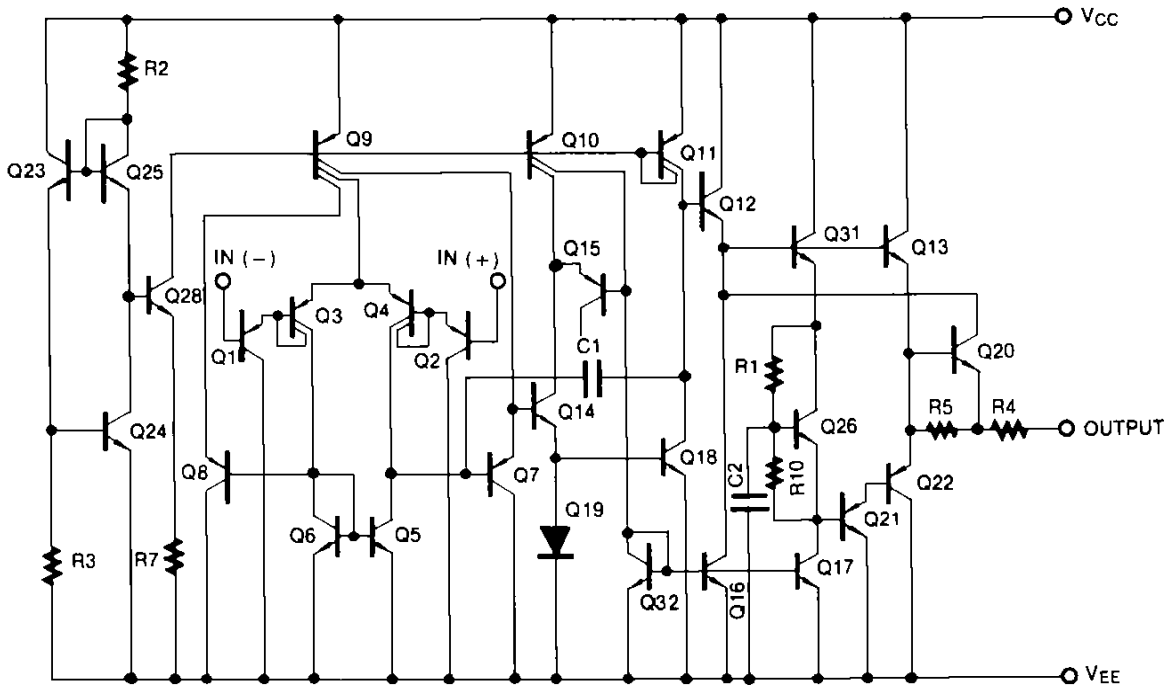
The KA3303 series is a monolithic Quad operational amplifier consisting of four independent amplifiers. The device has high gain, internally frequency, compensated operational amplifiers designed to operate from a single power supply or dual power supplies over a wide range of voltages. The common mode input range includes the negative supply, thereby eliminating the necessity for external biasing components in many applications.



### Internal Block Diagram



### Schematic Diagram



### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	VCC	±18 or +36	V
Differential Input Voltage	V <sub>I(DIFF)</sub>	36	V
Input Voltage	V <sub>I</sub>	±18	V
Output Short Circuit Duration	-	Continuous	-
Power Dissipation	P <sub>D</sub>	670	mW
Operating Temperature			
KA3303	T <sub>OPR</sub>	-40 ~ + 85	°C
KA3403		0 ~ + 70	°C
Storage Temperature	T <sub>STG</sub>	-65 ~ + 150	°C

## Electrical Characteristics

(VCC = +15V, VEE = -15V for KA3403, VCC = +14V, VEE = GND for KA3303, TA = 25 °C, unless otherwise specified)

Parameter	Symbol	Conditions	KA3303			KA3403			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	V <sub>IO</sub>	-	-	1.5	8.0	-	1.5	10	mV
		Note1	-	-	10	-	-	12	
Input Offset Current	I <sub>IO</sub>	-	-	5	75	-	5	50	nA
		Note1	-	-	150	-	-	100	
Input Bias Current	I <sub>BIAS</sub>	-	-	30	200	-	30	200	nA
		Note1	-	-	500	-	-	400	
Large Signal Voltage Gain	G <sub>V</sub>	V <sub>O(P-P)</sub> = ±10V	20	200	-	20	200	-	V/mV
		R <sub>L</sub> = 2KΩ	Note1	15	-	-	15	-	
Input Impedance	R <sub>I</sub>	-	0.3	1.0	-	0.3	1.0	-	MΩ
Output Voltage Swing	V <sub>O(P-P)</sub>	R <sub>L</sub> = 10KΩ	+12	+12.5	-	±12	±13.5	-	V
		R <sub>L</sub> = 2KΩ	+10	+12	-	±10	±13	-	
		R <sub>L</sub> = 2KΩ	Note1	+10	-	-	±10	-	
Input Common Mode Voltage Range	V <sub>I(R)</sub>	-	12V -VEE	12.5V -VEE	-	13V -VEE	13.5V -VEE	-	V
Common Mode Rejection Ratio	CMRR	R <sub>S</sub> ≥ 10KΩ	70	90	-	70	90	-	dB
Power Supply Current	I <sub>CC</sub>	V <sub>O(P)</sub> = 0, R <sub>L</sub> = ∞	-	2.8	7.0	-	2.3	7.0	mA
Output Short Circuit Current	I <sub>SC</sub>	Each amplifier	±10	±30	±45	±10	±20	±45	mA
Positive Supply Rejection Ratio	PSRR(+)	-	-	30	150	-	30	150	μV/V
Negative Supply Rejection Ratio	PSRR(-)	-	-	-	-	-	30	150	μV/V

## Electrical Characteristics (Continued)

(VCC = +15V, VEE = -15V for KA3403, VCC = +14V, VEE = GND for KA3303, TA = 25 °C, unless otherwise specified)

Parameter	Symbol	Conditions	KA3303			KA3403			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Average Temperature Coefficient of Input Offset Current (Note2)	$\Delta I_{IO}/\Delta T$	-	-	50	-	-	50	-	pA/°C
Input Offset Voltage Drift (Note2)	$\Delta V_{IO}/\Delta T$	-	-	10	-	-	10	-	$\mu V/^\circ C$
Power Bandwidth (Note2)	GBW	$G_V = 1, R_L = 2K\Omega, V_{O(P-P)} = 20VP-P, THD=5\%$	-	9.0	-	-	9.0	-	KHz
Small Signal Bandwidth (Note2)	BW	$G_V = 1, R_L = 10K\Omega, V_{O(P-P)} = 50mV$	-	1.0	-	-	1.0	-	MHz
Slew Rate (Note2)	SR	$G_V = 1, V_I = -10V \text{ to } +10V$	-	0.4	-	-	0.4	-	V/ $\mu s$
Rise Time (Note2)	T <sub>R</sub>	$G_V = 1, R_L = 10K\Omega, V_{O(P-P)} = 50mV$	-	0.35	-	-	0.35	-	$\mu s$
Fall Time (Note2)	T <sub>F</sub>	$G_V = 1, R_L = 10K\Omega, V_{O(P-P)} = 50mV$	-	0.35	-	-	0.35	-	$\mu s$
Over Shoot (Note2)	OS	$G_V = 1, R_L = 10K\Omega, V_{O(P-P)} = 50mV$	-	20	-	-	20	-	%
Phase Margin (Note2)	MPH	$G_V = 1, R_L = 2K\Omega, C_L = 200pF$	-	60	-	-	60	-	Degree
Crossover Distortion (Note2)	CD	$V_I = 30mVP-P, V_{O(P-P)} = 2.0VP-P, f = 10KHz$	-	1.0	-	-	1.0	-	%

### Note:

- KA3403: 0 °C ≤ TA ≤ +70 °C, KA3303: -40 °C ≤ TA ≤ +85 °C
- Guaranteed by design.

## Electrical Characteristics

( $V_{CC} = 5.0V$ ,  $V_{EE} = GND$ ,  $T_A = 25^\circ C$  unless otherwise specified)

Parameter	Symbol	Conditions	KA3303			KA3403			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	$V_{IO}$	-	-	-	10	-	2.0	10	mV
Input Offset Current	$I_{IO}$	-	-	-	75	-	30	50	nA
Input Bias Current	$I_{BIAS}$	-	-	-	500	-	200	500	nA
Large Signal Open Loop Voltage Gain	$G_V$	$R_L = 2.0K\Omega$	10	200	-	10	200	-	V/mV
Power Supply Rejection Ratio	PSRR	-	-	-	150	-	-	150	$\mu V/V$
Output Voltage Range	$V_{O(P-P)}$	$R_L = 10K\Omega$ , $V_{CC} = 5.0V$	3.3	3.5	-	3.3	3.5	-	V
		$R_L = 10K\Omega$ , $5.0V \leq V_{CC} \leq 30V$	$V_{CC} - 2.0$	$V_{CC} - 1.7$	-	$V_{CC} - 2.0$	$V_{CC} - 1.7$	-	
Supply Current	$I_{CC}$	-	-	2.5	7.0	-	2.5	7.0	mA
Channel Separation	CS	$f = 1KHz$ to $20KHz$	-	120	-	-	120	-	dB

# Typical Performance Characteristics

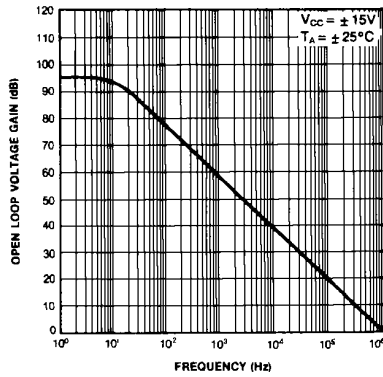


Figure 1. Open Loop Frequency Response

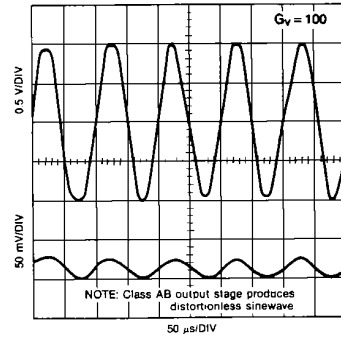


Figure 2. Wave Response

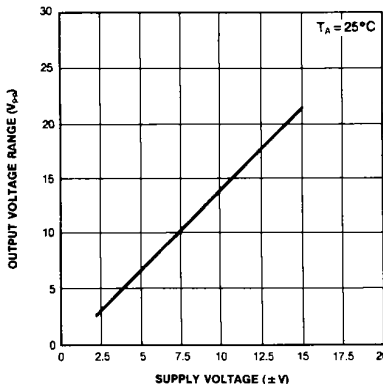


Figure 3. Output Swing

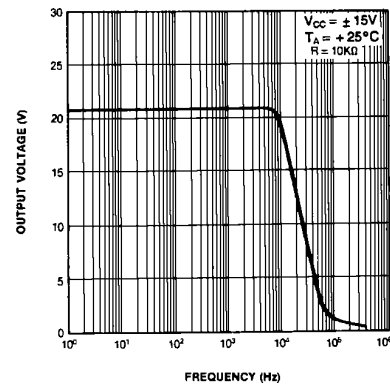


Figure 4. Output Voltage vs Frequency

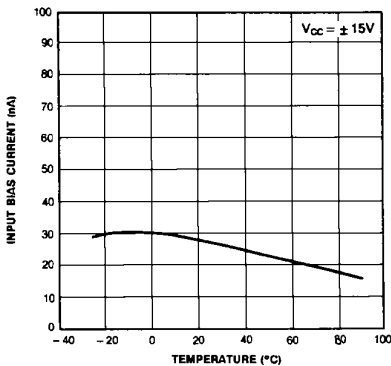


Figure 5. Input Bias Current vs Temperature

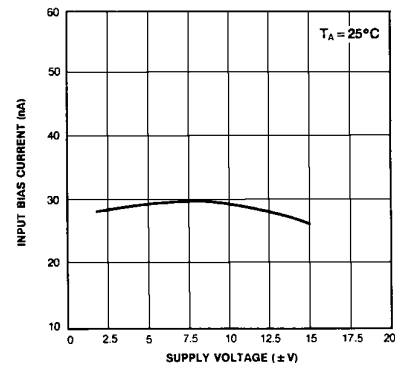


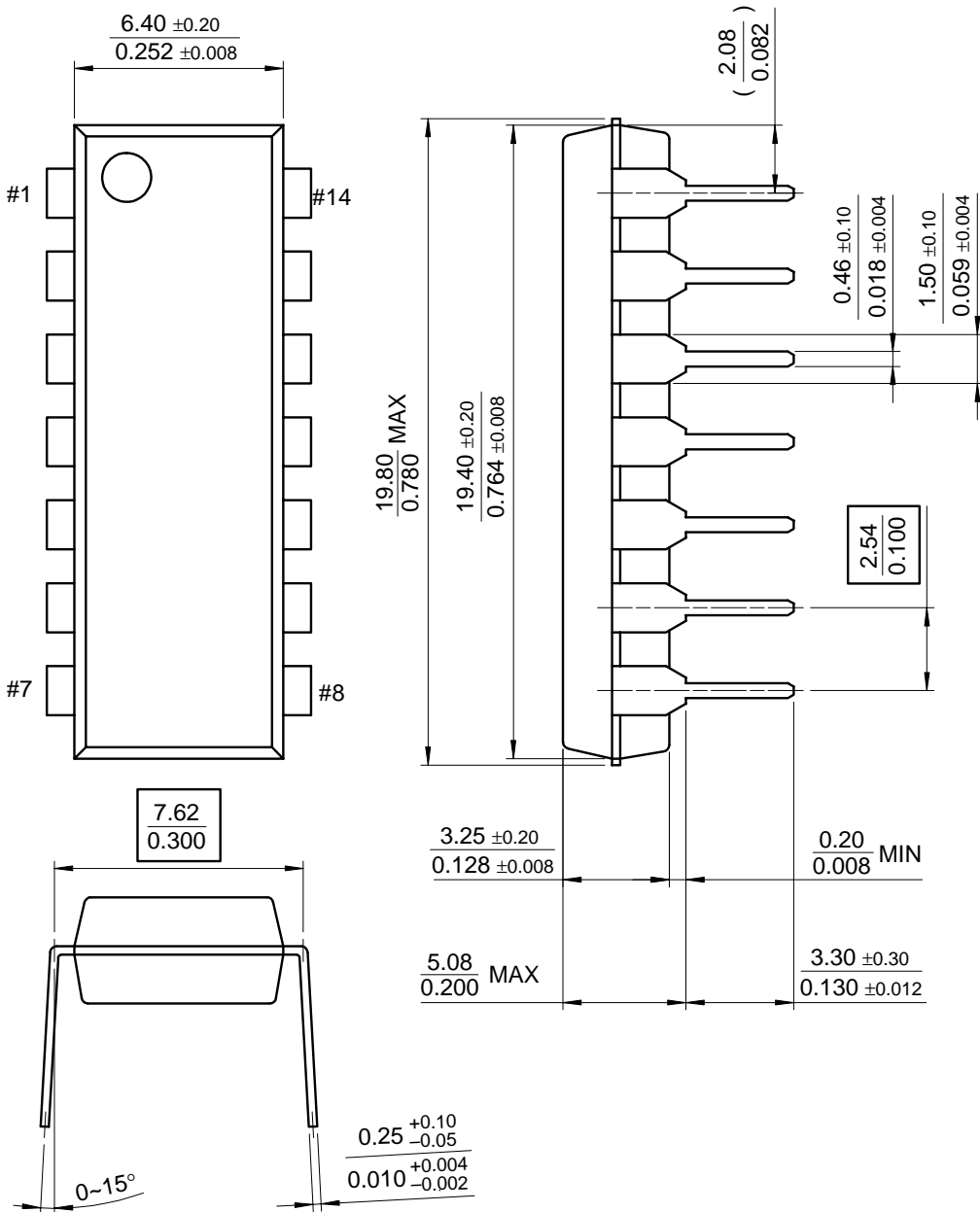
Figure 6. Input Bias Current vs Supply Voltage

# Mechanical Dimensions

Package

Dimensions in millimeters

## 14-DIP







---

## Ordering Information

Product Number	Package	Operating Temperature
KA3403	14-DIP	0 ~ + 70°C
KA3403D	14-SOP	
KA3303	14-DIP	-40 ~ + 85°C
KA3303D	14-SOP	

**DISCLAIMER**

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.